AMENDMENTS to the Claims

1. (currently amended) A shaft seal for passive convective air cooling of a rotatable shaft, the shaft seal comprising:

a cylindrical body including an internal annular core, the core having a central, axially-extending circular passage with at least one reverse internal helical or spiral groove for closely receiving the shaft and providing a pumping function as the shaft rotates to prevent leakage of fluid along the shaft, the body of the shaft seal including at least three ~~a plurality of~~ discrete, radially extending recesses opening along an exterior surface of the shaft seal and arranged in circumferentially-spaced relation to one another, and an annular cooling passage entirely and continuously circumferentially surrounding the internal core and fluidly connected with the radial recesses to provide thermal management for the shaft seal.

2. (original) The shaft seal as in claim 1, wherein the body of the shaft seal is a one piece, unitary component.

3. (original) The shaft seal as in claim 1, wherein the body of the shaft seal has an outer cylindrical side wall, and the radial recesses open along the outer cylindrical side wall.

4. (original) The shaft seal as in claim 3, wherein the radial recesses are evenly spaced around the side wall.

5. (original) The shaft seal as in claim 3, wherein the surface area around the outer cylindrical side wall encompassed by the recess openings is greater than the surface area of the remaining portions of the side wall, surrounding the openings.

6. (original) The shaft seal as in claim 1, wherein the radial recesses are axially elongated.

7. (original) The shaft seal as in claim 1, wherein the body of the shaft seal includes a first annular end wall at one end of the shaft seal, and an opposite annular end wall, axially spaced from the first end wall, at an opposite end of the shaft seal.

8. (original) The shaft seal as in claim 7, wherein the body of the shaft seal includes a series of axial through bores extending between and interconnecting the end walls, and a series of elongated fasteners can be received in the through bores to fixedly attach the shaft seal to a housing.

9 (original) The shaft seal as in claim 7, wherein the body of the shaft seal has an outer cylindrical side wall, extending between and interconnecting the end walls.

10. (original) The shaft seal as in claim 9, wherein the side wall has a substantially constant radial dimension along the entire length of the shaft seal between the end walls.

11. (original) The shaft seal as in claim 1, wherein the recesses radially intersect the cooling passage.

12. (currently amended) A gear pump and shaft seal combination, comprising:

a housing assembly including a plurality of plates, and inlet and outlet ports in the housing assembly;

a plurality of gears having intermeshing teeth, said gears supported for rotation between the plates, the inlet and outlet ports providing fluid flow into an area of expanding cavities between the teeth, and providing fluid flow out of an area of contracting cavities between the teeth, one of said gears being supported for rotation on a drive shaft, said drive shaft projecting axially through an opening in one of said plates and externally of the housing assembly to enable rotation of the gears;

the shaft seal fixed to the one plate, and including a cylindrical body with an internal annular core having a central circular passage with a reverse internal helical or spiral groove, the central passage closely receiving an external portion of the drive shaft and the

reverse internal groove providing a pumping function as the drive shaft rotates to prevent leakage of fluid from the housing along the drive shaft, the body of the shaft seal including at least three ~~a plurality of~~ discrete, radially extending recesses opening along an exterior surface of the shaft seal and arranged in circumferentially-spaced relation to one another, and an annular cooling passage entirely and continuously circumferentially surrounding the internal core and fluidly connected with the radial recesses to provide passive convective air cooling for the shaft seal as the drive shaft rotates.

13. (original) The combination as in claim 12, wherein the body of the shaft seal is a one piece, unitary component.

14. (original) The combination as in claim 12, wherein the body of the shaft seal has an outer cylindrical side wall, and the radial recesses open along the outer cylindrical side wall.

15. (original) The combination as in claim 14, wherein the radial recesses are evenly-spaced around the circumference of the outer cylindrical side wall.

16. (original) The combination as in claim 14, wherein the surface area around the outer cylindrical side wall encompassed by the recess openings is greater than the surface area of the remaining portions of the side wall, surrounding the openings.

17. (original) The combination as in claim 12, wherein the radial recesses are axially elongated.

18. (original) The combination as in claim 12, wherein the body of the shaft seal includes a first annular end wall at one end of the shaft seal in abutting relation with an outer surface of the one plate, and an opposite annular end wall, axially spaced from the first end wall, at an opposite end of the shaft seal.

19. (original) The combination as in claim 18, wherein the shaft seal body includes a series of axial through bores extending between and interconnecting the end walls, and a plurality of elongated fasteners are received in the throughbores to fixedly attach the shaft seal to the one plate of the housing.

20. (original) The combination as in claim 19, wherein the axial throughbores are arranged such that the fasteners pass internally through the entire length of the shaft seal.

21. (original) The combination as in claim 18, wherein the body of the shaft seal has an outer cylindrical side wall, extending between and interconnecting the end walls.

22. (original) The combination as in claim 12, wherein the side wall has a substantially constant radial dimension along the entire length of the shaft seal between the end walls.

23. (original) The combination as in claim 12, wherein the recesses radially intersect the cooling passage.

24. (currently amended) A fluid transfer device and shaft seal combination, comprising:

a housing including inlet and outlet ports;

pump means supported in the housing, the inlet and outlet ports directing fluid to and away from the pump means, a rotatable drive shaft projecting axially externally of the housing operatively connected to the pump means;

the shaft seal fixed with respect to the housing, and including a one piece, unitary body with an internal core circumferentially surrounding the shaft, the internal core including a central passage closely receiving an external portion of the drive shaft and seal means along an interior surface of the central passage for preventing fluid leakage along the drive shaft as the drive shaft rotates;

the body of the shaft seal including at least three ~~a plurality of~~ discrete, radially-extending recesses opening along an exterior side surface of the shaft seal, and a cooling chamber entirely and continuously surrounding the internal core and fluidly

connected with the radial recesses to provide passive conductive air cooling for the shaft seal as the drive shaft rotates.

25. (original) The combination as in claim 24, wherein the radial recesses are evenly-spaced around the circumference of the shaft seal body.

26. (original) The combination as in claim 24, wherein the surface area of the side surface of the shaft seal encompassed by the recess opening is greater than the surface area of the remaining portions of the side surface, surrounding the recess openings.

27. (original) The combination as in claim 23, wherein the radial recesses are axially elongated.

28. (original) The combination as in claim 24, wherein the body of the shaft seal includes a first end wall at one end of the shaft seal in abutting relation with an outer surface of the housing, and an opposite end wall, axially spaced from the first end wall, at an opposite end of the shaft seal.

29. (original) The combination as in claim 28, wherein the body of the shaft seal includes a series of axial throughbores extending between and interconnecting the end walls, and a plurality of elongated fasteners are received in the throughbores to fixedly attach the shaft seal to the housing.

30. (original) The combination as in claim 29, wherein the axial throughbores are arranged such that the fasteners pass internally through the entire length of the shaft seal.

31. (original) The combination as in claim 23, wherein the body of the shaft seal has a substantially constant exterior dimension along the entire length of the seal between the end walls.

32. (original) The combination as in claim 24, wherein the recesses radially intersect the cooling passage.